

Claims

1. A method of inserting auxiliary digital data in a main digital data stream which is subsequently to be coded to produce a coded data stream, the method comprising identifying at least one component of the main data stream which will make substantially no contribution to the coded data stream and inserting data from the auxiliary data stream in the or each component to produce an output data stream carrying the auxillary data.
2. A method according to Claim 1 wherein the main data comprises audio data to be coded according to an MPEG-type audio coding scheme and identifying at least one component comprises estimating sub-bands which are unoccupied or estimating quantisation levels, the auxillary data being inserted in unoccupied subbands or at a level below (or at) the quantisation noise floor.
3. A method of inserting auxillary data into an audio data stream to be coded by analysing the audio data into a plurality of sub-bands and quantising the sub-bands, the method comprising estimating sub-bands and quantisation levels for a subsequent or previous coding and inserting the auxillary data at a level substantially below the level of estimated quantisation noise.
4. A method according to any preceding claim, further comprising coding the output data stream.
5. A method according to Claim 4, comprising adjusting or selecting at least one parameter or decision associated with said coding in dependence on data from the auxillary data stream.

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6. A method according to Claim 4 or 5 wherein the auxiliary data is extracted prior to or during said coding.
7. A method according to any preceding claim wherein coding includes quantising data words corresponding to said main digital data stream, or a transformed version thereof, to a plurality of levels less than the number of levels codable by said data words.
8. A method according to Claim 2 or 3 or any claim dependent thereon wherein estimating sub-bands and quantisation levels includes transforming the audio data from the time domain to the frequency domain.
9. A method according to Claim 8 wherein the auxiliary data is inserted in the frequency domain to produce modified frequency domain data, and the modified frequency domain data is transformed back to the time domain.
10. A method according to any preceding claim, including decoding a previously coded data stream to generate said main digital data stream, wherein identifying the or each component or estimating sub-bands and quantisation levels is based on information concerning the previous coding.
11. A method according to any preceding claim wherein the auxiliary data is used to establish synchronisation with or to maintain consistency with a previous coding of the main data stream.
12. A method according to any preceding claim wherein the auxiliary data to be carried includes a defined synchronisation sequence.
13. A method according to any preceding claim wherein the auxiliary data or synchronisation signal is inserted into an upper subband of the main data.

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14. A method of carrying a synchronisation sequence with a digital audio signal comprising inserting a defined sequence of synchronisation words into a component of the digital audio signal to facilitate identification of or synchronisation with previous coding of the signal.

5 15. A method according to Claim 12 or 14 wherein the sequence comprises at least 4 words.

16. A method of detecting a frame boundary or establishing synchronisation with a data signal produced by any of Claims 12, 14 or 15 comprising searching for a sequence of synchronisation words in said  
10 component of the data signal and comparing at least one value found, or a value derived therefrom, to a stored sequence of values.

17. A method according to any preceding claim, wherein the auxillary data or the synchronisation sequence is inserted at a decoder which generates the main digital data signal from a previously coded signal.

15 18. A digital data stream produced by a method according to any preceding claim.

19. A digital data stream, preferably a linear PCM audio bitstream, comprising an audio signal and at least one of a synchronisation sequence or an auxillary data signal embedded in an otherwise unused subband or in  
20 subbands below an MPEG quantisation noise floor.

20. Apparatus for inserting auxillary data into a data stream comprising means for receiving a main digital data stream which is subsequently to be coded to produce a coded data stream, means for identifying at least one component of the main data stream which will make substantially no

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contribution to the coded data stream and means for inserting auxillary data in the or each component to produce an output data stream carrying the auxillary data.

21. Apparatus according to Claim 20 wherein the identifying means  
5 comprises means for estimating sub-bands which are unoccupied or means for estimating quantisation levels of an MPEG-type audio coding process.

22. Apparatus for inserting auxillary data into an audio data stream to be coded by analysing the audio data into a plurality of sub-bands and quantising the sub-bands, the apparatus comprising means for estimating  
10 sub-bands and quantisation levels for a subsequent or previous coding and means for inserting the auxillary data at a level substantially below the level of estimated quantisation noise.

23. Apparatus according to Claim 21 or 22 wherein the means for  
estimating sub-bands and quantisation levels includes means for  
15 transforming the audio data from the time domain to the frequency domain.

24. Apparatus according to Claim 23 including means for inserting the auxillary data in the frequency domain to produce modified frequency domain data and means for transforming the modified frequency domain data back to the time domain.

20 25. Apparatus according to any of Claims 20 to 24 comprising a decoder for decoding a previously coded data stream to generate said main digital data stream.

26. Apparatus according to Claim 25, wherein the means for identifying the or each component or estimating sub-bands and quantisation levels is

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arranged to use information concerning the previous coding.

27. Apparatus according to Claim 25 or 26 arranged to insert auxillary data for use in establishing synchronisation with or maintaining consistency with a previous coding of the main data stream.

5 28. Apparatus according to any of Claims 20 to 27 arranged to insert a defined synchronisation sequence as at least part of the auxillary data.

29. Apparatus according to any of Claims 20 to 28 arranged to insert the auxillary data or synchronisation signal into an upper subband of the main data.

10 30. Apparatus for processing a digital audio signal arranged to insert a synchronisation sequence comprising a defined sequence of synchronisation words into a component of the main audio signal to facilitate identification of or synchronisation with previous coding of the signal.

31. Apparatus according to Claim 28 or 30 wherein the sequence  
15 comprises at least 4 words.

32. A system according to any of Claims 20 to 31, further comprising means for coding the output data stream.

33. A coder for coding a digital data stream produced by a method according to any of Claims 1 to 17 or apparatus according to any of Claims  
20 20 to 31 arranged to extract said auxillary data prior to or as part of coding the signal.

34. A coder according to Claim 33 including means for adjusting or

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selecting at least one parameter or decision associated with coding in dependence on data from the auxillary data stream.

35. Apparatus for detecting a frame boundary or establishing synchronisation with a data signal produced by a method according to any of
- 5 Claims 12, 14 or 15 comprising means for searching for a sequence of synchronisation words in said component of the data signal and comparing at least one value found, or a value derived therefrom, to a stored sequence of values.

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